Potential Roles for Satellite Communications in Air Traffic Management

Chairpersons:
Israel Greenfeld
Mark Schell

Proposition 1:
Satellite ATM has only one role, namely providing ATC via CPDLC and ADS

- Command/control for UAVs; ATC voice relay
- UAV payload communications
- Combining cabin and cockpit data – entertainment is the economic driver
- What is the potential impact of software radio?
- Re-use of satcom frequencies for short range domestic repeater functions
- What is the value of oceanic weather updates?
- Note that the FAA has decided not to be a weather information provider
- Cost/benefit of weather information would be the driver
- Are there potential security applications? Air marshall palm-pilot applications

Proposition 2:
The application of a technically and economically sound satellite communications ATM solution is confined to oceanic/remote regions.

- What technologies exist today that allows this type of service in domestic airspace
- What are the lessons learned from Boeing's recent (5 yrs ago?) effort to develop a global satellite based ATM system?
- Cost is the barrier to domestic use – need to increase the number of users
- What are requirements in oceanic airspace to enabled reduced separation? Comm, nav, surveillance
- How do you justify the expense required to get to 30/30 separation?
- At some point under 30/30 you need direct voice (?)
- Inherent VDL-2 constraint of lack of priority/pre-emption mechanism - Satellite might offer an opportunit

Proposition 2:
The application of a technically and economically sound satellite communications ATM solution is confined to oceanic/remote regions.

- Discussion of PARC – how is RCP defined?
- PARC is also developing a data link roadmap – considering today's technologies
- Requirements – total system performance. Can satellites provide some functions?
- Why install additional equipment to obtain satellite service in domestic airspace when the capability of 5 nm separation is already met
- DO 289 safety and performance requirements for continental airspace
- What about Europe's plans for satcom in upper airspace?
- It may be driven by needing a political solution to dealing with the many individual states
- NexSAT is studying this for Eurocontrol

Proposition 2:
The application of a technically and economically sound satellite communications ATM solution is confined to oceanic/remote regions.

- Although Europe has a portion of I-4 overlap, there will always be a previous generation inmarsat that might be able to provide a minimal backup (?)
- Any issues with beam to beam handoffs? They would be make-before-break handoffs (?)
- Are we certain about the 3rd I-4?
- Do you lose the economic benefits of combining services on one link due to the need to meet the most stringent performance requirement?
- Entertainment will evolve much more quickly
- Can you certify a set of links and achieve the needed reliability than cannot be achieved on individual links.
- Would there be capacity problems in many/all aircraft were using satcom for ATC in the future?

Proposition 3:
All satellite communications ATM systems should be government owned, designed and operated.

- Can the government afford it?
- Japan launched MTSAT
- A commercial company needs to make a profit – the gov't might otherwise be forced to do it
- Does ATM require a dedicated satellite?
- Is the cost higher for buying services from a commercial provider?
- Work from the requirements.
- Discussion of JPDO results; 8th IPT is "global harmonization"
- JPDO is US-centric but the solution must be global
- Move toward privatization of ATM in other countries – many different business models
- Need total system performance requirements

Proposition 3:
All satellite communications ATM systems should be government owned, designed and operated.

- What prevents us from using commercial services?
  - Certification
  - May depend on the application, domain
  - Latency (voice requirement) – would a more data intensive environment change the latency requirement?
- Costs of ATC-only links may be too high
- Recent launch of Inmarsat 4 – 432 kbps
- Potential for Iridium to be able to provide safety services

Conclusions

- If requirements are established, and a satcom link can meet those requirements, there's no reason you would not use satcom
  - But the economic case would have to close
  - Requirements would vary between applications
  - Analyze benefits of combining applications
  - Performance tradeoffs vs. costs
- It would be better to measure reliability of service (RCP?) by considering a set of links rather than requiring each individual link to meet that performance
  - It would be better if RCP definitions allowed this approach
- Unfair economic benefits/penalties may accrue due to mandating of equipage
  - ANSPs need to be more active in providing economic incentives to address this problem, or other means of relief
  - Accelerate the end-to-end implementation
- Satellite communications is the ultimate solution for oceanic
  - Consider how they can then provide other services
  - The percentage of fleets equipping for oceanic may become high in the future